

About the Corps

The U.S. Army Corps Of Engineers

An Introduction

The purpose of this subject area is to introduce your students to the U.S. Army Corps of Engineers and their role as a water management agency.

The first section of activities is included to introduce your students to the roles of the Corps. Activities that take advantage of the visitor facilities at Bonneville Dam are next, and finally, activities for after your visit have been included to reinforce the concepts learned about the Corps.

History Quickie

President Jefferson, recognizing the need for information about the area west of the Mississippi, dispatched his private secretary, Captain Meriwether Lewis, along with Captain William Clark, on their now-famous expedition.

It was the U.S. Army Corps of Engineers which received the overall assignment for surveying and exploring the West. The officers in charge of the operations were educated at West Point, which was founded by the Corps and was the only engineering school in the country at the time. They were commissioned as topographical engineers. Their mission was to obtain the scientific data necessary for opening the frontier to settlement. They became scientist-explorers, skilled in both the natural sciences and in the practical techniques of surveying and mapping.

Important Concepts

The activities in this section will help the student understand the following concepts. Important vocabulary words are in bold print.

The **Army Corps of Engineers** built and operates Bonneville Lock and Dam. An **engineer** is someone who uses mathematical and scientific principles in the design, construction and operation of structures, equipment and systems.

The Corps is a part of the U.S. **government**. The leader of this and other parts of the U.S. government is the President of the United States.

Some people who work for the Corps are in the Army; some are not. Most of the people who work for the Corps are civilians. Bonneville Dam is operated by civilian employees of the Corps.

The Army Corps of Engineers was founded in 1775 when Colonel Richard Gridley was appointed by George Washington as Chief Engineer of the Continental Army during the Revolutionary War.

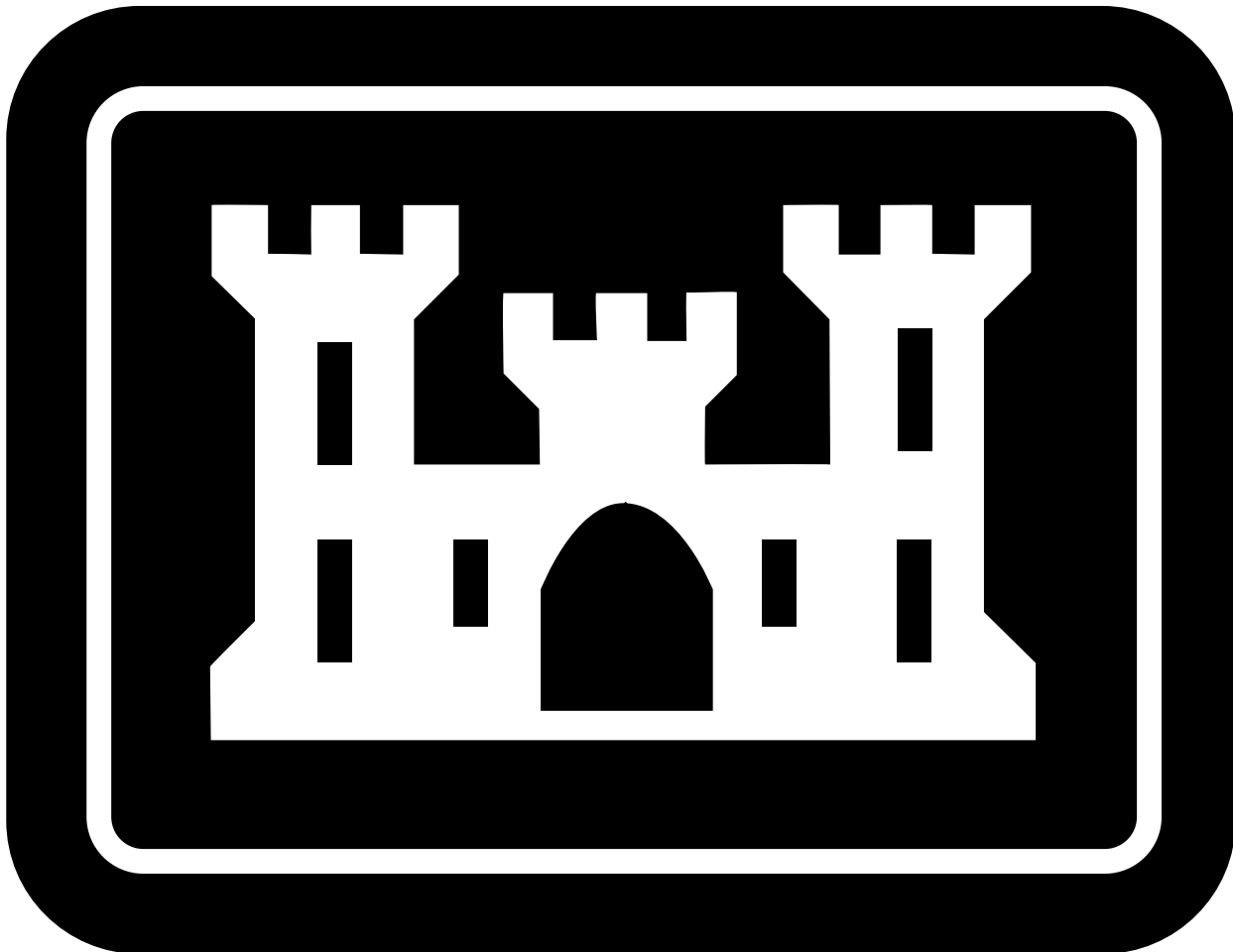
After the war the new nation needed roads and bridges and forts. As the nation's only organized engineers, the Corps was assigned the challenge and began its dual role in defense and civil works.

Later the Corps was given the task of making the Mississippi River **navigable**, and thus taken the role of a **water management agency**.

As a water management agency, the Corps has several missions. They are: **producing hydropower**, improving **navigation** by providing locks, maintaining inland **waterways** and harbors, managing **natural resources** in such a way as to provide **environmental protection** and enhancement, managing **recreation sites**, providing **flood control**, supplying water for **irrigation**, industry and municipalities.

At Bonneville Dam we do four of those things: produce hydropower, provide navigation locks, manage for recreation, and manage the natural resources.

The castle you see below is the Corps insignia. It symbolizes fortification, a traditional activity of military engineers.



The U.S. Army Corps of Engineers Before Your Visit

The two following activities, the Water Cycle Game, and Mission: Decode, are intended to introduce your students to the Corps role as a water resource management agency.

Activities

The Water Cycle Game

The Water Cycle Game, complete with directions and rules, is attached. After you have played the basic Water Cycle Game a few times, you can add these advanced rules to make the game more challenging!

Pre-game Discussion:

To help your students make the connection between the water cycle and the missions of the Corps at Bonneville Dam, talk briefly about these before the game. Four missions have been mentioned on the board: navigation, resource management and hydropower generation.

Beginning and Taking Turns:

Begin and proceed with the game in the same manner as before.

Special Instructions:

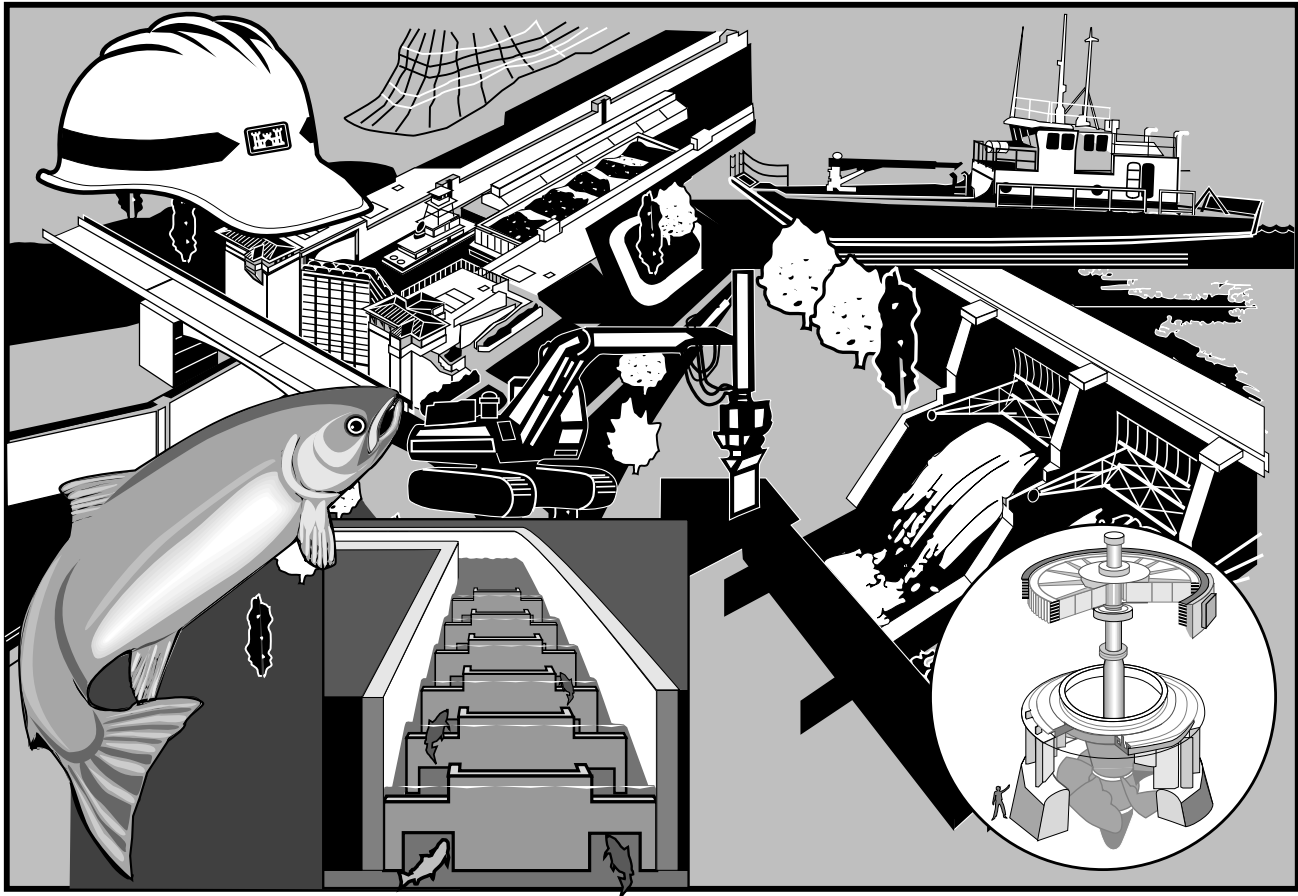
For this advanced version, each student will need paper and pencil. When a player lands on a blue drop, follow the instructions and answer the question listed below for that drop number. If the correct answer is given, one point is scored. Keep track of the score!

Ending:

Go through the Water Cycle Game twice. After all markers have evaporated to the clouds the second time, add each person's points. The person with the most points is the winner.

Mission: Decode

This activity will give students a chance to discover and understand the responsibilities or missions of the U.S. Army Corps of Engineers.





The Water Cycle Game

Drop Number

Question

-
- 2a How is a glacier different from a patch of snow?
 - 2b What is precipitation?
 - 5a In which season are floods most likely to happen?
 - 5b In which season are droughts most likely to happen?
 - 7a What does 'transpiration' mean?
 - 7b What is a water table?
 - 11a What does "irrigate" mean?
 - 11b Why do farmers irrigate?
 - 19a What is "navigation"
 - 19b What are some of the products that are taken through the navigation locks
 - 28a What is wrong with dumping garbage into the river?
 - 28b How can litter hurt wildlife?
 - 33a What is the minimum number of people you should have in a boat when pulling a water skier?
 - 33b What is a "P.F.D."?
 - 39a Why do salmon swim up the river?
 - 39b What are fish ladders for?
 - 41a What is another word for "making" electricity.
 - 41b Which federal agencies build and operate dams to make electricity?
 - 46a What is an "estuary"?
 - 46b What is a tide?
 - 50a What does "evaporate" mean
 - 50b Name three types of precipitation?



The Water Cycle Game

Answers:

Drop Number	Question
2a	How is a glacier different from a patch of snow? <i>A patch of snow will melt in the spring. A glacier has many layers of snow that have turned into ice and will remain through the seasons.</i>
2b	What is precipitation? <i>Precipitation is water falling from the sky in some solid or liquid form.</i>
5a	In which season are floods most likely to happen? <i>Spring, in the Columbia River Basin.</i>
5b	In which season are droughts most likely to happen? <i>Summer, in the Columbia River Basin</i>
7a	What does 'transpiration' mean? <i>A tree has specialized cells called stomata in its leaves and stems which are like the pores in our skin. Water evaporates from these stomata when they are open. This is called transpiration.</i>
7b	What is a water table? <i>The water table is the level of the water in the ground, or how far you have to dig to have a well.</i>
11a	What does "irrigate" mean? <i>Irrigate means to "supply water for use on farm land, by artificial means"</i>
11b	Why do farmers irrigate? <i>Many times farmers irrigate when their farms are in a warm, sunny location with fertile soil, but not enough rain to support the crops they are trying to grow. Therefore, they bring the water to the plants.</i>
19a	What is "navigation" <i>Navigation is like driving somewhere in your car using a road map, except that it is done in a boat on the water.</i>
19b	What are some of the items that are taken through the navigation locks? <i>Grains, wood chips, lumber, petroleum products, salmon and trout fingerlings</i>
28a	What is wrong with dumping garbage into the river? <i>A river is home for many types of life. Pollution can kill native plants, animals and fish.</i>

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- 28b How can litter hurt wildlife?
Litter usually isn't biodegradable (does not decompose on its own) Even slowly degrading litter can ensnare or be toxic to animals.
- 33a What is the minimum number of people you should have in a boat when pulling a water skier?
At least two; one to operate the boat and one to watch the skier.
- 33b What is a "P.F.D."?
Personal flotation device...a life jacket.
- 39a Why do salmon swim up the river?
Salmon swim upstream to return to the place they were spawned, where they will lay their eggs and die.
- 39b What are fish ladders for?
Fish ladders make it possible for returning adult salmon to pass over the dam by providing "steps".
- 41a What is another word for "making" electricity?
"Generating" electricity.
- 41b Which federal agencies build and operate dams to make electricity?
Army Corps of Engineers and Bureau of Reclamation.
- 46a What is an "estuary"?
An estuary is a partially enclosed coastal area where ocean water flows into the mouth of a river during high tide. It is a zone of both salt and fresh water. Where these two environments meet, a unique and biologically productive area is formed.
- 46b What is a tide?
A tide is the periodic rise and fall of water in the ocean caused by the gravitational pull of the moon.
- 50a What does "evaporate" mean?
Evaporate means to change water from a liquid state to a gaseous state. In nature, this process is powered by the energy of the sun.
- 50b Name three types of precipitation?
Rain, sleet, hail, snow.

SECRET

05,81,8,2,91

Hold up to mirror to decode

Mission: Decode

Your mission is to decode the messages below.

Here is how the code works. The numbers 1 through 26 stand for the letters A through Z respectively. Therefore

1 = A, 2 = B, 3 = C, etc. Fill in the correct letters and decode the message.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

1. The Army Corps of Engineers is a part of the 21, 14, 9, 20, 5, 4 19, 20, 1, 20, 5, 19 government. The 12, 5, 1, 4, 5, 18 of the Corps and of our 3, 15, 21, 14, 20, 18, 25 is the 16, 18, 5, 19, 9, 4, 5, 14, 20 of the United States.
2. The Army Corps of Engineers and other parts of the United States government are 6, 21, 14, 4, 5, 4 by the 20, 1, 24, 5, 19 that people pay.
- 3 Three of the main jobs of the Corps of Engineers are building and maintaining 4, 1, 13, 19, navigation 12, 15, 3, 11, 19, and 10, 5, 20, 20, 9, 5, 19.
4. 6, 12, 15, 15, 4 control and 9, 18, 18, 9, 7, 1, 20, 9, 15, 14 are two reasons that some dams are built.
5. The Army Corps of Engineers 4, 5, 19, 9, 7, 14, 5, 4 and operates 2, 15, 14, 14, 5, 22, 9, 12, 12, 5 Lock and Dam.
6. The main missions of the Corps of Engineers at Bonneville Dam are generating hydroelectric power, maintaining and improving 14, 1, 22, 9, 7, 1, 20, 9, 15, 14, managing natural 18, 5, 19, 15, 21, 18, 3, 5, 19, and providing recreational opportunities.
7. The Bonneville project includes navigation 12, 15, 3, 11, 19, a 19, 16, 9, 12, 12, 23, 1, 25 dam, two power houses, two visitor centers, and a fish 8, 1, 20, 3, 8, 5, 18, 25.
8. Hydroelectric power allows all of us to use 5, 12, 5, 3, 20, 18, 9, 3, 9, 20, 25 generated by the energy of 18,9,22,5,18 water. This electricity comes to us in a 16, 15, 12, 12, 21, 20, 9, 15, 14-free, renewable form.
9. Navigation locks at dams make it possible for large 2, 1, 18, 7, 5, 19 pushed by 20, 21, 7 boats to transport oil, 7, 18, 1, 9, 14, and wood products up and down the river.
10. Lots of people use Corps of Engineer's areas for recreation. Many people 6, 9, 19, 8, swim, 3, 1, 13, 16, and boat in these areas.
11. The Corps of Engineers is also responsible for 13, 1, 14, 1, 7, 9, 14, 7 natural resources. One important 18, 5, 19, 15, 21, 18, 3, 5 in the Columbia River is fish.
12. At Bonneville Dam, fish 12, 1, 4, 4, 5, 18, 19 were built to help fish swim upstream to their 19, 16, 1, 23, 14, 9, 14, 7 grounds.

19,5,3,18,3,20 SECRET

Hold up to mirror to decode

Mission: Decode

Answers:

1. *United States, leader, country, President*
2. *Funded, taxes*
3. *Dams, locks, jetties*
4. *Flood, irrigation*
5. *Designed, Bonneville*
6. *Navigation, resources*
7. *Locks, spillway, hatchery*
8. *Electricity, river, pollution*
9. *Barges, tug, grain*
10. *Fish, camp*
11. *Managing, resource*
12. *Ladders, spawning*

The U.S. Army Corps of Engineers During Your Visit

Your students can learn more about the Corps of Engineers during their visit to Bonneville Dam. Here are some suggestions to accomplish that goal.

What To Do On Your Way To The Project:

While traveling to the project, your students can look for barges in the river. Most of these barges have to pass through the locks at Bonneville Dam. Also, look for transmission lines. These lines may be carrying the electricity produced at Bonneville Dam to the homes of your students.

Ask The Visitor Center Employees:

The staff at the Bradford Island Visitor Center and at the Visitor Orientation Building will be happy to tell your group about the roles of the Corps of Engineers.

Bradford Island Visitor Center:

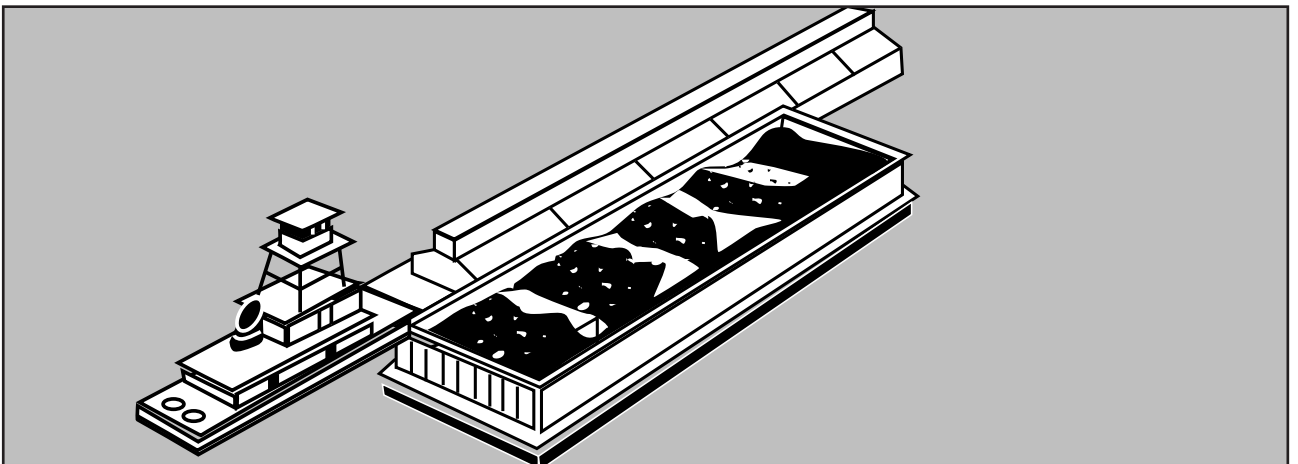
Exhibits on the fourth floor of the Bradford Island Visitor Center will introduce your students to the role of the Corps of Engineers. There are also displays on the fourth floor about the jobs done by Army Corps employees.

Films:

Films about the Corps of Engineers are shown in the theaters at the Bradford Island Visitor Center and the Visitor Facility at the second powerhouse. Please request a film showing when you schedule your visit.

Visitor Orientation Building:

On the main floor of the Visitor Orientation Building (on the Washington shore), you will find talking figures that explain the duties and tasks of five employees at Bonneville Dam.



The U.S. Army Corps Of Engineers After Your Visit

The following activities are to be completed after your visit to Bonneville Dam. They are intended to reinforce vocabulary and concepts learned before and during the visit.

Activities

Name The Missions Of The Corps:

This activity will reinforce understanding of the missions or responsibilities of the U.S. Army Corps of Engineers.

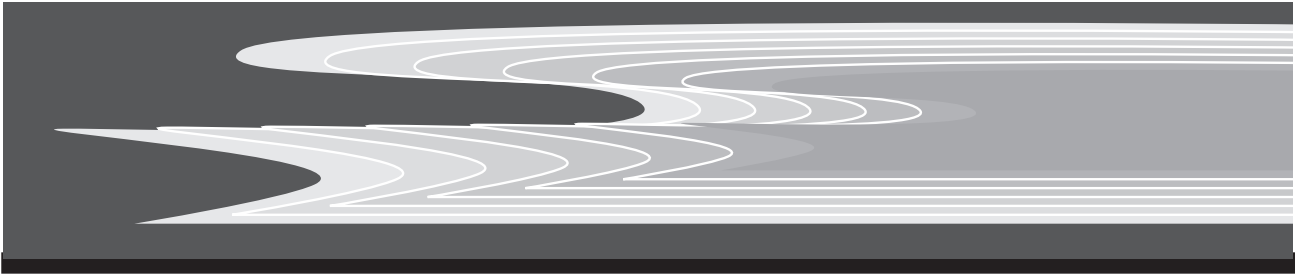
Who Am I?:

Many people work at Bonneville Dam keeping it operating smoothly, helping visitors and working to maintain the natural resources of the area. This activity gives students an opportunity to match the employee with the tasks they accomplish.

Visit Other Projects:

The Dalles, John Day and McNary dams are the next three dams on the Columbia River, they also were designed and are operated by the Corps of Engineers.





Name The Missions Of The Corps!

Match the words in the list of missions of the Corps with their definitions.

The list of missions:

1. Navigation
2. Hydropower
3. Flood Control
4. Irrigation Water Storage
5. Resource Management
6. Water Based Recreation Management

Definitions to match them to:

- A. ____ A clean renewable source of electricity
- B. ____ Improving and maintaining waterways for the passage of ships
- C. ____ Managing resources for the safe enjoyment of waterways
- D. ____ Using, protecting and enhancing environmental resources
- E. ____ Controlling the river's flow to prevent flooding
- F. ____ Impounding water used to grow crops in dry areas

Name The Missions Of The Corps!

Answers:

- A. (2) Hydropower
- B. (1) Navigation
- C. (6) Water Based Recreation Management
- D. (5) Resource Management
- E. (3) Flood Control
- F. (4) Irrigation Water Storage





Who Am I?

Match the job title with the description of the tasks performed on the job.

Job Title:

- | | |
|--------------------------|-----------|
| Carpenter | 1. _____ |
| Fish Biologist | 2. _____ |
| Fish Counter
trained | 3. _____ |
| Garage Mechanic | 4. _____ |
| Welder | 5. _____ |
| Lock Operator | 6. _____ |
| Electrician/
Mechanic | 7. _____ |
| Painter | 8. _____ |
| Park Guide | 9. _____ |
| Park Ranger | 10. _____ |
| Powerhouse
Operator | 11. _____ |
| Project Manager | 12. _____ |
| Secretary | 13. _____ |

Task Performed:

- I paint everything from turbines to cabinets.
- I start and stop generators and control the flow of water through the dam.
- I ensure the safety of the public. I am in rescue and first aid.
- I evaluate fish passage and perform research to improve salmon runs.
- I operate the navigation lock which lifts boats past the dam.
- I keep the generators in good condition.
- I provide information and services for the public.
- I type, file and work as a receptionist
- I count fish as they pass by the dam. Many agencies use my information to help fish.
- I perform a wide variety of tasks all involving wood.
- I keep all vehicles in good condition.
- I join metal to metal with my torch. I make and repair anything metal.
- I supervise the entire project and all employees.



Who Am I?

Answers:

1. Painter
2. Powerhouse Operator
3. Park Ranger
4. Fish Biologist
5. Lock Operator
6. Electrician/Mechanic
7. Park Guide
8. Secretary
9. Fish Counter
10. Carpenter
11. Garage Mechanic
12. Welder
13. Project Manager

